PATENT SPECIFICATION

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Complete Accepted: Feb. 16, 1928.

COMPLETE SPECIFICATION.

Improvements in Apparatus for the Colloidal Dispersion of Material in Fluids.

I, JEAN BOURDAIS, of 89, rue des Martyrs, Paris, France, a citizen of the French Republic, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to improvements in the dispersion of colloidal materials and in mills therefor.

It has been proposed to disperse the material in liquid form by centrifugal action through perforations arranged in the peripheries of a series of concentric chamber, the liquid being admitted into the chamber having the smallest radius and finally emerging from that with the largest radius.

It has also been proposed to employ two rotary discs having notched and recessed surfaces, mounted concentrically on independent shafts so that the material to be dispersed is caused to take a sinuous path from the centre to the periphery between the two discs, the discs being rotated in reverse directions or the same direction as may be desired.

The present invention consists in providing a surface through which the colloidal material is forced comprising a grid or circular ring built up of a number of plates or discs provided with spacing shoulders to leave a predetermined distance between the surfaces of adjacent discs.

The invention further consists in the employment of such surfaces in a centrifugal colloidal dispersion mill the material mixed with a fluid being discharged from the rotor through nozzles on to the surfaces through which it passes at a relatively high velocity.

The invention will be described with reference to the accompanying drawings.

Fig. 1. Elevation of a grid constructed according to the invention (considerably enlarged).

Fig. 2. Section on line II—II Fig. 1.

Fig. 3. Section on line III—III Fig. 1.

Fig. 4. Vertical section through a circular ring of discs (enlarged).

Fig. 5. Section on line V—V Fig. 4.

[Price 1/-]

Fig. 6. Vertical section of centrifugal colloidal dispersion mill.

Fig. 7. Section on line VII—VII Fig. 6.

Fig. 8. Vertical section of a further centrifugal colloidal dispersion mill.

Fig. 9. Vertical section of a similar machine in which the grid surfaces are carried by the casing.

The dispersion surfaces shown in Figs. 1, 2 and 3 comprise flat plates 61 provided with shoulders 62, to space the plates apart whereby spaces 63 are left between adjacent plates through which the material to be dispersed is forced. The plates are mounted in a frame 64 provided with screws 65 for mounting the plates therein. The colloidal material held in suspension in any suitable fluid is forced through nozzles (not shown) on to the grid passing through the plates at a velocity in excess of 50 meters per second. The distance between adjacent plates in the grid is in general a few tenths of a millimetre.

Figs. 4 and 5 show the grids arranged in the form of a ring the plates or discs 76 being formed with shoulders 77 for spacing purposes. The discs forming the ring are assembled together and anchored in position by bolts 78 at intervals passing through holes formed therein. The colloidal material suspension is fed into a centrifugal machine and ejected therefrom through nozzles on to the ring of discs.

When the mixture under treatment comprises solid bodies, these should be preliminarily reduced to fine powder, for instance by grinding in the dry state, and then mixed as uniformly as possible with the containing fluid. The final state of dispersion will vary directly with the speed of passage through the grid and the setting of the plates or discs.

If it is desired to obtain stable colloidal suspensions, the fluid into which the dispersion takes place should preferably, not be electrolytic or it should be only slightly so. If the fluid is electrolytic, the addition of protecting colloids will facilitate the stabilising of the suspension.

The formation of the colloidal suspension will be furthered by the addition of

dispersing substances or of a small quantity of a body which acts as a solvent for the material to be dispersed. In order that the dissociation shall take place properly, care must be taken to avoid the use of a very concentrated mixture. As a rule, some 10 per cent. of the material to be dispersed will be found to be a suitable proportion.

The centrifugal machine illustrated in Figs. 6 and 7 comprises a rotor 27 mounted on a shaft 14 rotating in bearings 12. Some colloidal material for use on starting the machine is contained in a feed chamber 18 from which it is fed into an annular chamber 17 in a casing 10 which communicates with ducts 31 in the rotor 27. An inlet pipe 19 to the chamber 17 is provided for the normal supply of colloidal material.

A second rotor 21 is mounted on a shaft 13, rotating in bearings 11, co-axial with the shaft 14. This second rotor is formed with a flange around its periphery to enclose the rotor 27. Both rotors 27 and 21 are arranged inside the casing or frame 10 which is provided with a cover 15 the fluid being dispersed from the second rotor 21 into this chamber 16 within the casing from which it escapes through an outlet 20.

The rotor 27 is formed with two arms 28, 29 which project outwards from the body 27 towards the flange on the rotor 21 each arm being constructed with an internal passage 30 each connecting with one of the ducts 31 and arranged at right angles to these latter.

Nozzles 32 are provided to screw into the ends of the arms 28, 29 and a further series of nozzles 33, 34 are provided part way along the passages 30 through which nozzles the fluid is dispersed into the second rotor. The second rotor 21 is formed with a series of annular grooves 22, 23, 24 for the insertion of grid surfaces 25 held in position by screws 26 similar to those described with reference to Figs. 4 and 5 arranged in the line of the discharge from the nozzles 34, 33, 32 so that the fluid discharged from the nozzles impinges upon the grid surface and passes through it into the outer chamber 16, ducts 45 being provided behind the grids through which the fluid passes.

The rotor 21 may rotate in the opposite direction to the rotor 27 in the same direction or it may be stationary. Means may be employed for closing the nozzles 32, 33 or 34 if it is not desired to employ all of these at the same time.

In the arrangement shown in Fig. 8 the shafts 13 and 14 are arranged vertical. A horizontal inlet pipe 50 is provided having flanges 51 and 52 projecting upwards parallel to the shaft 14 to form a sleeve around the lower portion of the rotor. The fluid entering through the pipe 50 passes through apertures 53 operated by suitable valves (not shown). A pipe 54 also communicates with the outside of the casing and may be closed if desired.

The machine shown in Fig. 9 is not provided with a second rotor, the grids 25 being mounted directly on the inner wall of the casing 55; the rotor 56 is mounted on the shaft 14 and is provided with a co-axial fluid inlet pipe 57 rotating in bearings 58.

The outer casings of all these machines must obviously be made fluid tight when operating under pressure or in a vacuum.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. Apparatus for the colloidal dispersion of material comprising a grid or circular ring through which the material is forced built up of a number of plates or discs provided with spacing shoulders to leave a predetermined distance between the surfaces of adjacent discs substantially as described.

2. A centrifugal mill for the colloidal dispersion of fluid comprising a rotor, an inlet to the rotor for the fluid nozzles in the rotor through which the fluid is ejected on to grid surfaces built up of a number of plates or discs provided with spacing shoulders to leave a predetermined distance between the surfaces of adjacent discs mounted on a second rotor or on the wall of the casing substantially as described.

3. Apparatus for the dispersion of solids or liquids mixed with fluid substantially as described with reference to the accompanying drawings.

Dated this 28th day of February, 1927.

J. OWDEN O'BRIEN,
Late W. P. Thompson & Co., of Manchester,
Patent Agent.

Fig. 1

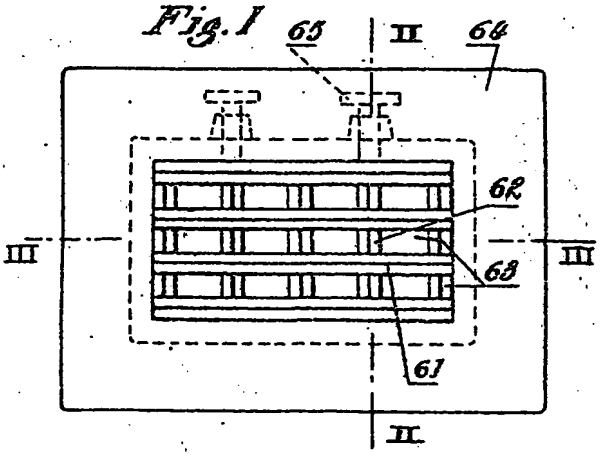


Fig. 2

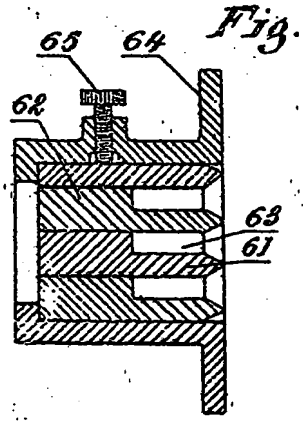


Fig. 3

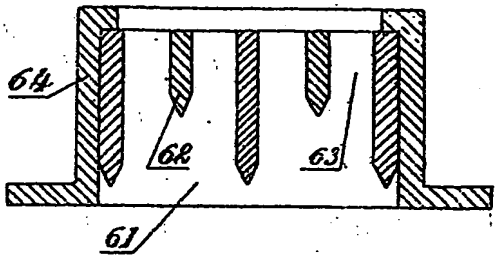
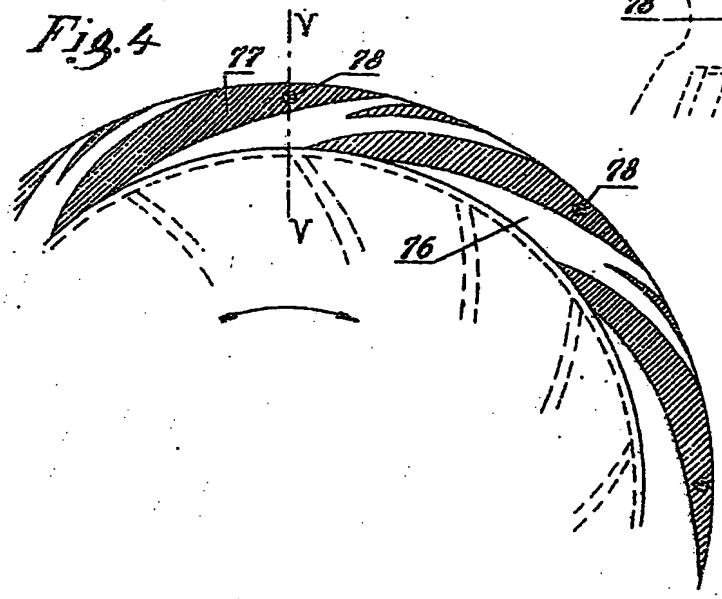


Fig. 4



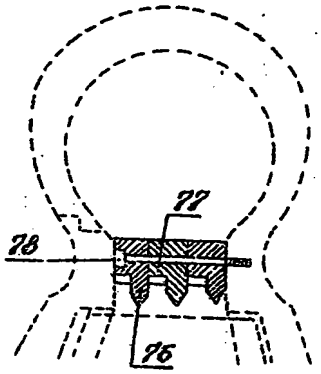


Fig. 5

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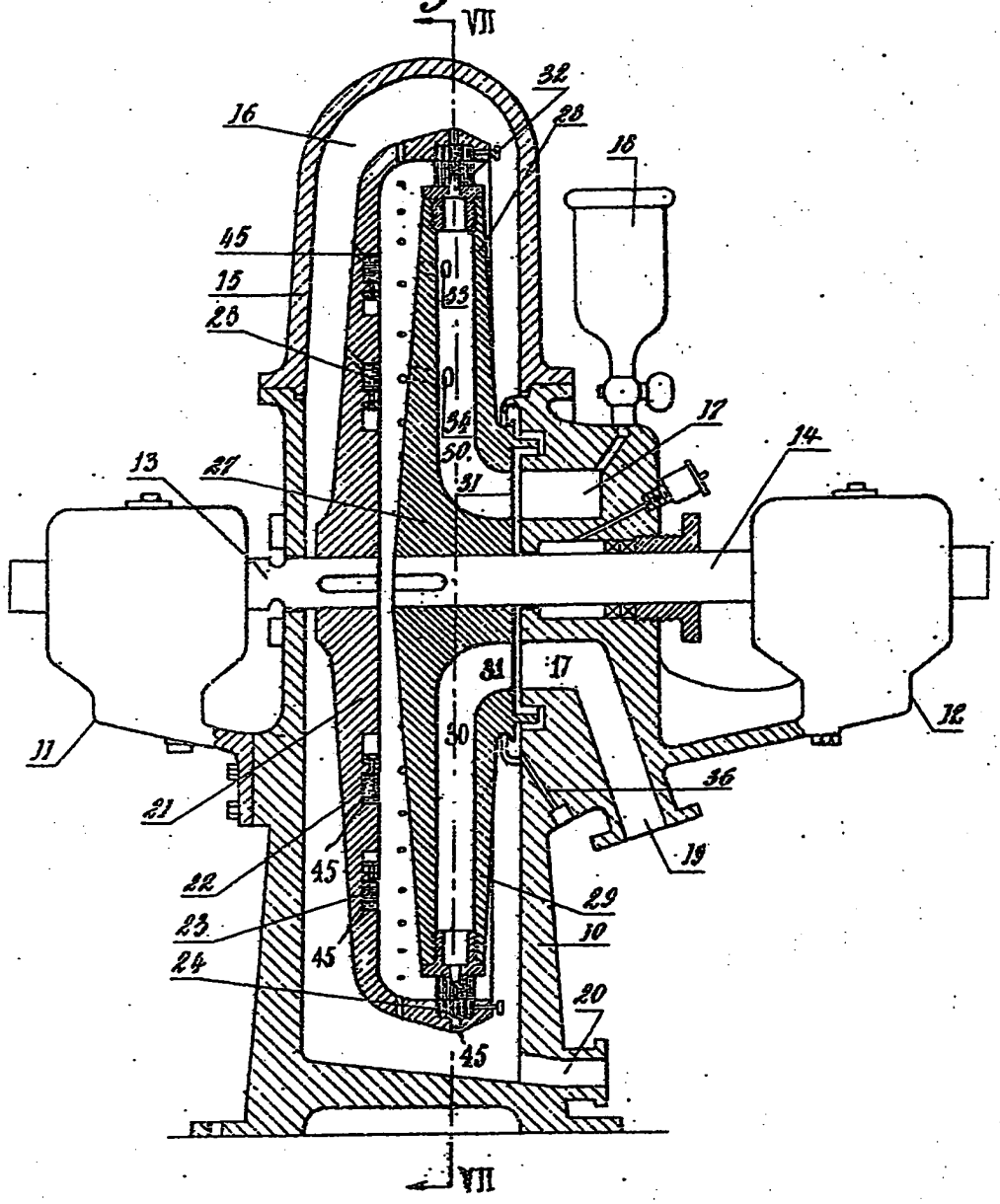
Fig. 6



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4 SHEETS
SHEET 2

SHEET 1

[This Drawing is a reproduction of the Original on a reduced scale.]

Fig. 1

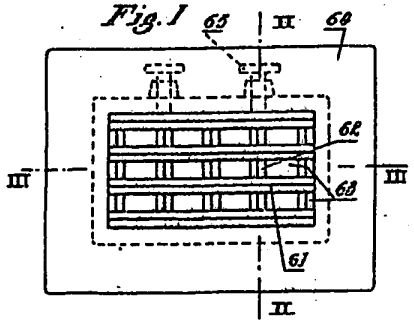


Fig. 2

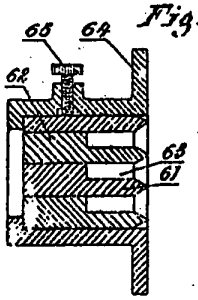


Fig. 3

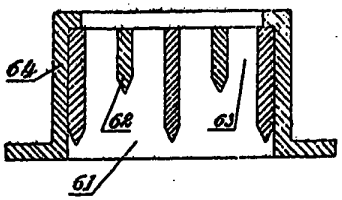
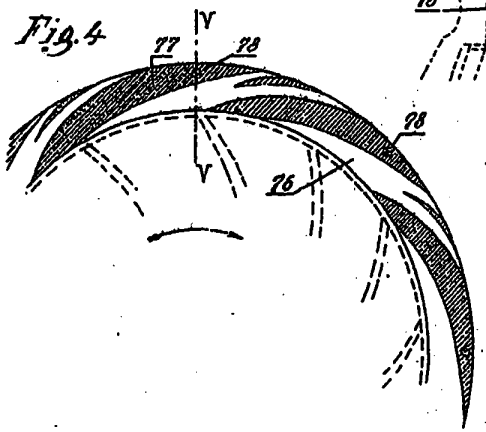


Fig. 4



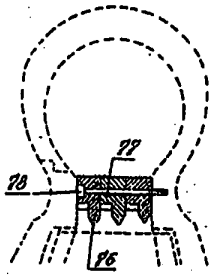


Fig. 5

Fig. 6

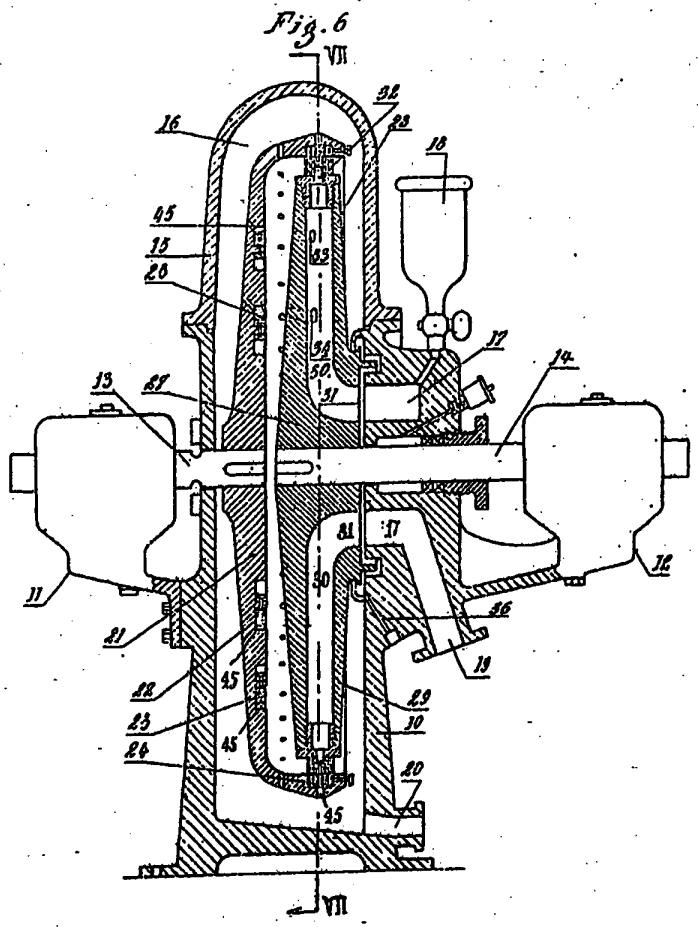


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Fig. 7

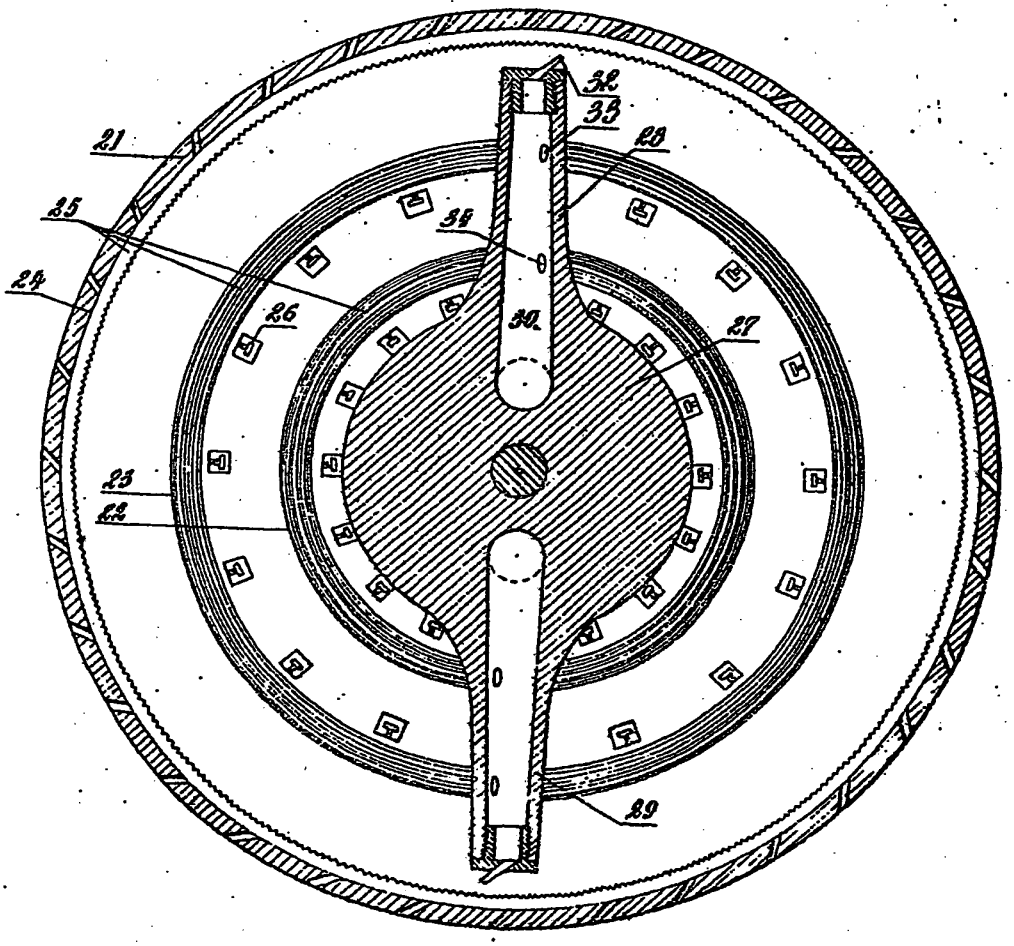

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Fig. 8

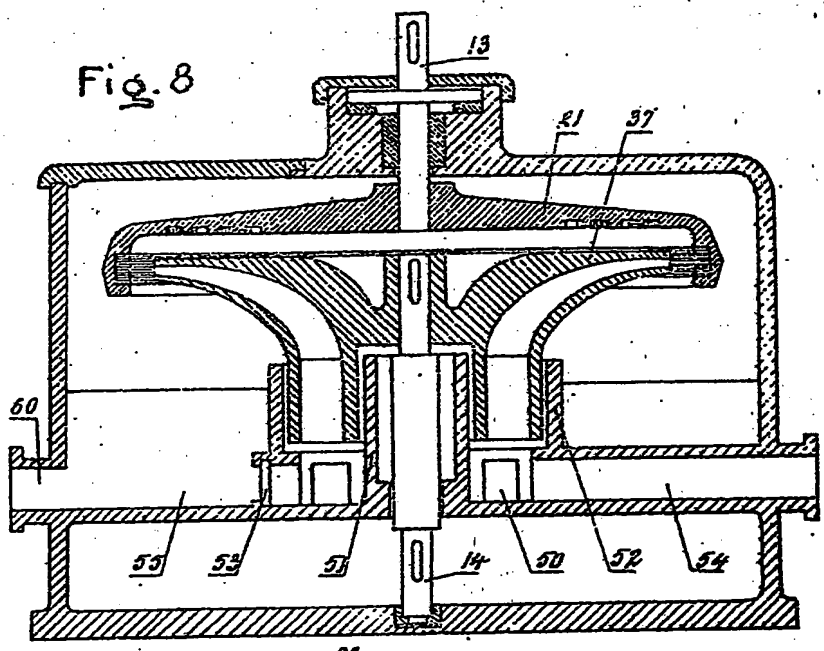

Fig. 9

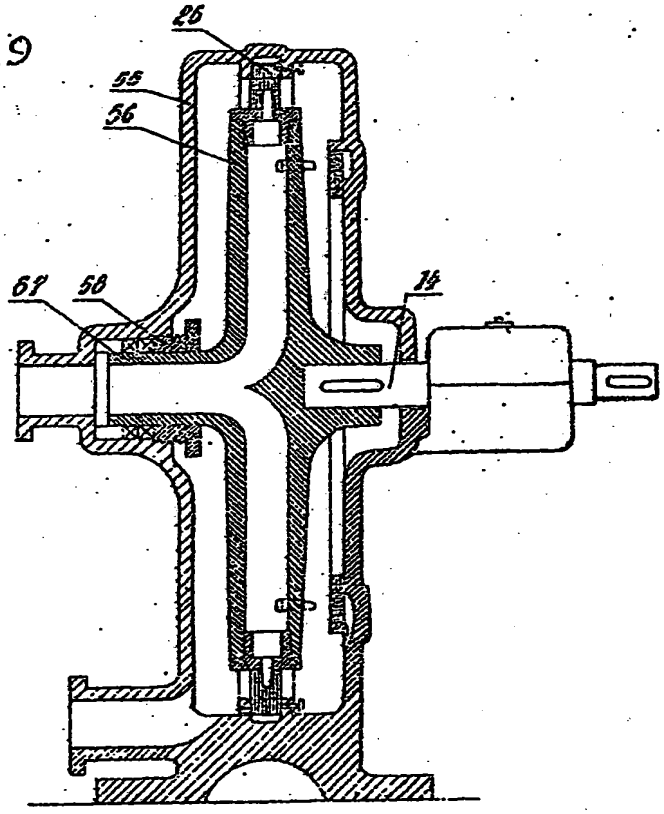

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Fig. 7

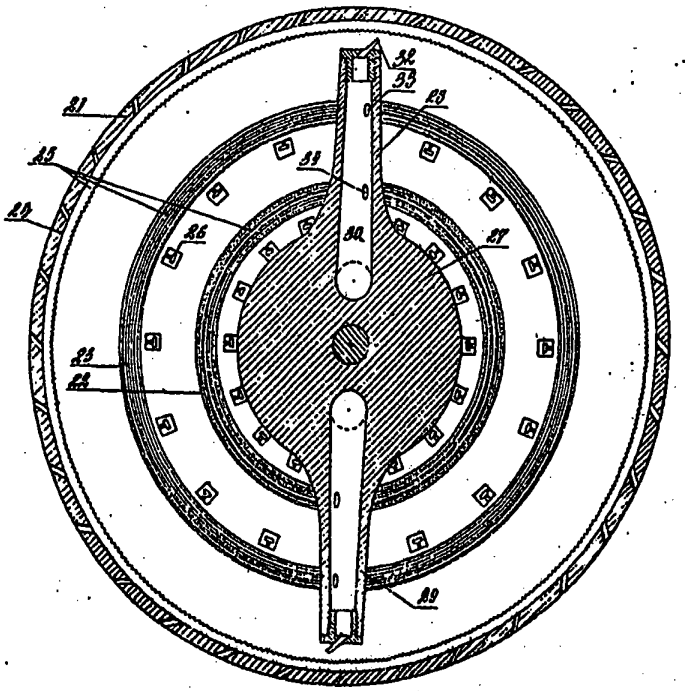


Fig. 8

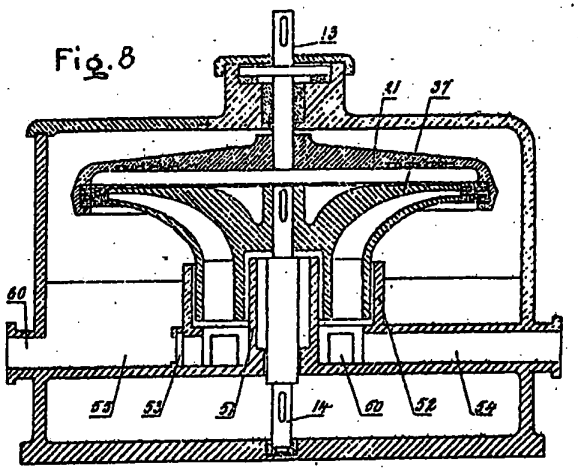
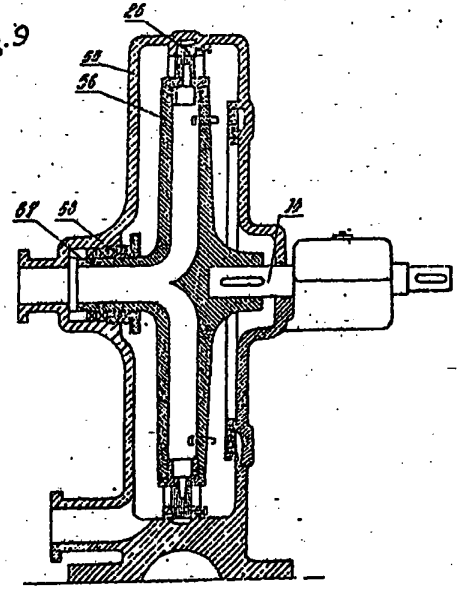


Fig. 9



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